FLOWERING BULBS

FOR CANADIAN GARDENS

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FLOWERING BULBS
FOR CANADIAN GARDENS

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TYPES OF BULBS

True Bulbs

DAFFODIL

LILY

Corms

CROCUS

GLADIOLUS

Tubers

BEGONIA

Tuberous Roots

DAHLIA

Rhizomes

IRIS

INTRODUCTION

This publication gives descriptions of four types of flowering bulbs and details on culture and propagation. The four types—true bulbs, corms, tubers, and rhizomes—differ in structure and in the way they produce new plants.

A *true bulb*, as in the tulip, is a thick, underground stem that has a growing point or bud in which the embryo of the next year's plant is surrounded by overlapping, fleshy layers of tissue. These scalelike layers make the bulb look very much like an onion. The scales are often wrapped tightly around the growing point, as in the daffodil, or they may be loosely joined together at the base plate, as in the lily. The base plate is really the underground stem of the bulb; the bud and scales develop from the upper side of the plate, and roots develop from the edges and lower side.

For new plants, extra buds develop from the top of the base plate and grow between the scales of the bulb. The plants increase by gradual division (one or two new buds), as in the daffodil, or by multiplication (several buds), as in the tulip.

A *corm* is a solid mass of storage tissue that has one or more growing points on top and a base plate on the underside. Crocuses and gladiolus have corms. During growth, roots spring from the edges of the base plate and the storage tissue shrivels.

After the plant blooms, one or more corms for next year's plants grow on top of the old base plate. New plants also grow from bulblets or cormels that develop on the roots or edges of the base plate.

A *tuber*, like a corm, is a solid mass of storage tissue but it does not have a base plate. Shoots and roots grow from the eyes, or growing points.

Some tubers, as in the dahlia, shrivel during growth and increase by growing new tubers, in the same way as potatoes. Others, as the begonia, increase in size; in these, new plants are obtained by cutting the tubers into pieces, each containing an eye.

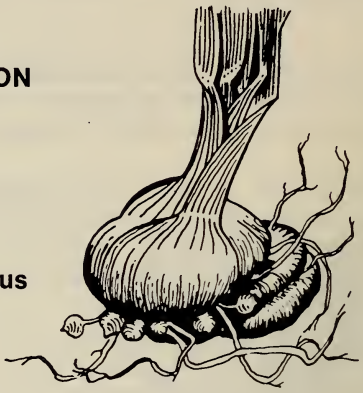
A *rhizome* is a thick, solid, underground stem made up of storage tissue. Stems and leaves develop from eyes or buds on the top, and roots from the underside. Irises grow from rhizomes.

For new plants the rhizomes are cut into sections, each containing an eye.

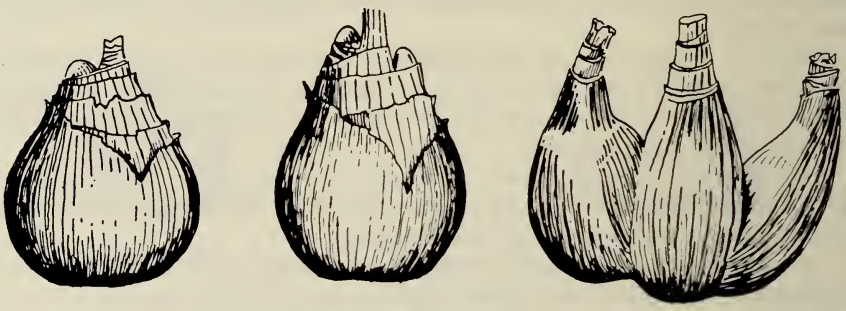
EXTENT OF THE BULB INDUSTRY IN CANADA

Gladiolus, dahlias, irises, and lilies are grown commercially in various parts of Canada, but other bulbs in only a few small areas of British Columbia, particularly the southern tip of Vancouver Island. Bulbs such as tulips and daffodils generally do better in districts that have a long, cool spring. At Ottawa, for example, the jump from winter dormancy to maturity is so rapid that the plants have little time to store up food for large bulbs; also, the hot,

METHODS OF REPRODUCTION



Cormels: Gladiolus



Division: Daffodil

Multiplication: Tulip

dry summers induce the production of extra buds from the base plate. This results in multiplication of small bulbs and offsets, rather than production of large bulbs. Consequently, millions of the flowering bulbs bought each year by Canadian gardeners are imported from other countries, mainly Holland. If you desire information on producing bulbs commercially, write to the Horticulture Branch, British Columbia Department of Agriculture, 400-808 Douglas St., Victoria, B.C. V8W 2Z7.

USES OF BULBS IN THE LANDSCAPE

So great is the variety, and so diverse are the ideal conditions for growth, that bulbous plants can be grown to suit any place where bright color rather than permanent form is needed in the landscape. Spring crocuses and early tulips give a glorious show of color soon after the snow disappears; the gladiolus displays its beauty in midsummer, and the dahlia is the most varied of the late-summer flowers. The last two are especially popular with horticultural hobbyists, who usually grow them for their value as specimens for show rather than for their contribution to the landscape.

Often the mention of bulbs conjures up a picture of formal beds crowded with early tulips in blocks of yellow, pink, or red. Or we may think of informal groupings of daffodils, and later tulips, along the back of a herbaceous border, with groups of crocuses, squills, and other small bulbs at the front. These smaller ones, together with various species of tulips, are also very effective in a rock garden. Another way bulbs are used to add seasonal color is to place them in groups among the shrubs in a foundation planting; the bright colors of the flowers are impressive against a multishaded green background such as this.

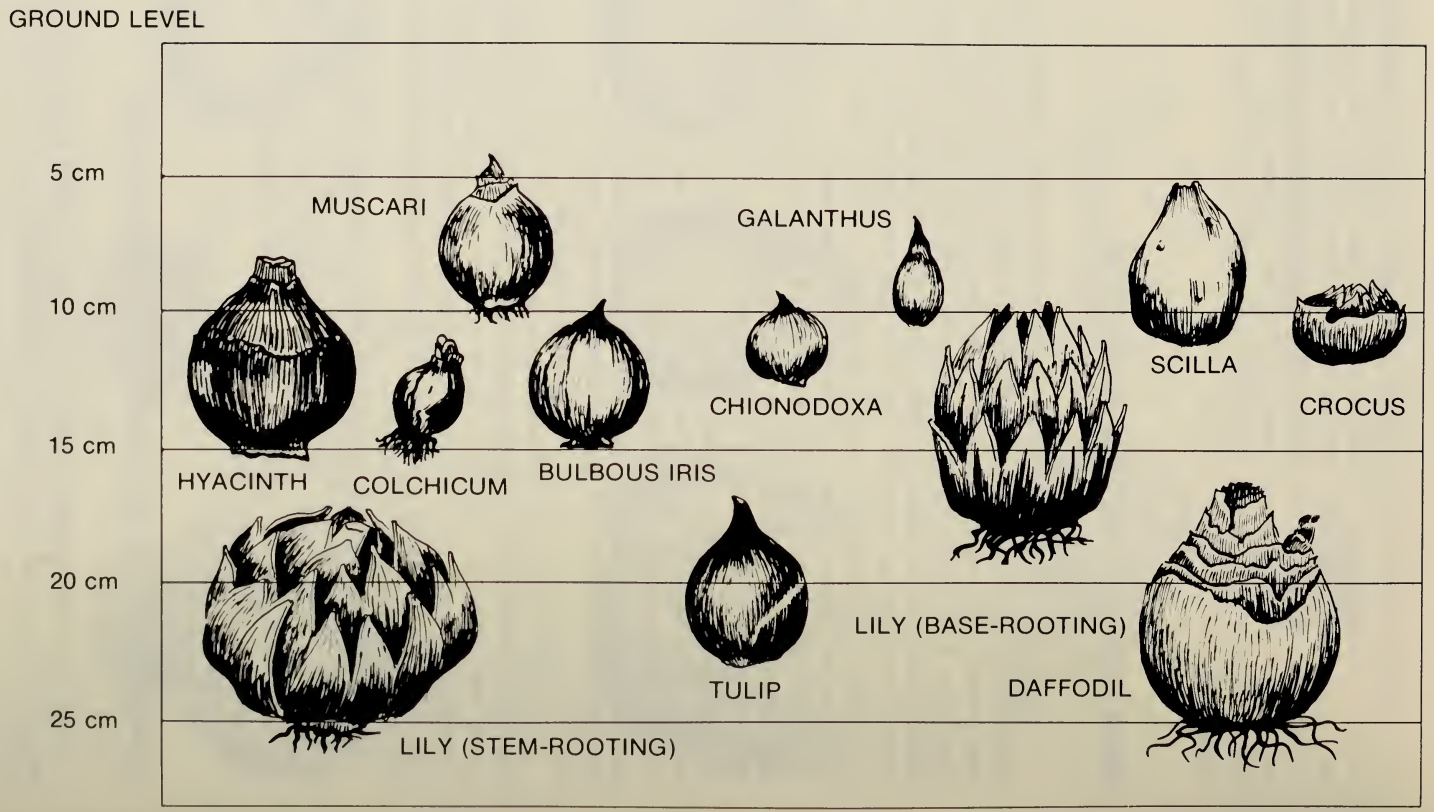
In addition to the spring-flowering bulbs, there are many hardy bulbs that flower later in the season. These bulbs, which are included in the descriptions under the headings "Common hardy bulbs" and "Other bulbs grown in Canada," are most useful in the home landscape. Some are hardy in most of Canada and they provide a contrast when grown among shrubs and a change of plant form in a perennial border.

Bulbs also add to the attractiveness of other areas. Many wildflowers, such as trilliums and trout-lilies, spring from bulbs that can be left in the same spot in a shaded perennial border or wild garden for several years. Daffodils, when naturalized on a grassy slope or in open woodlands, will grow for several years without attention.

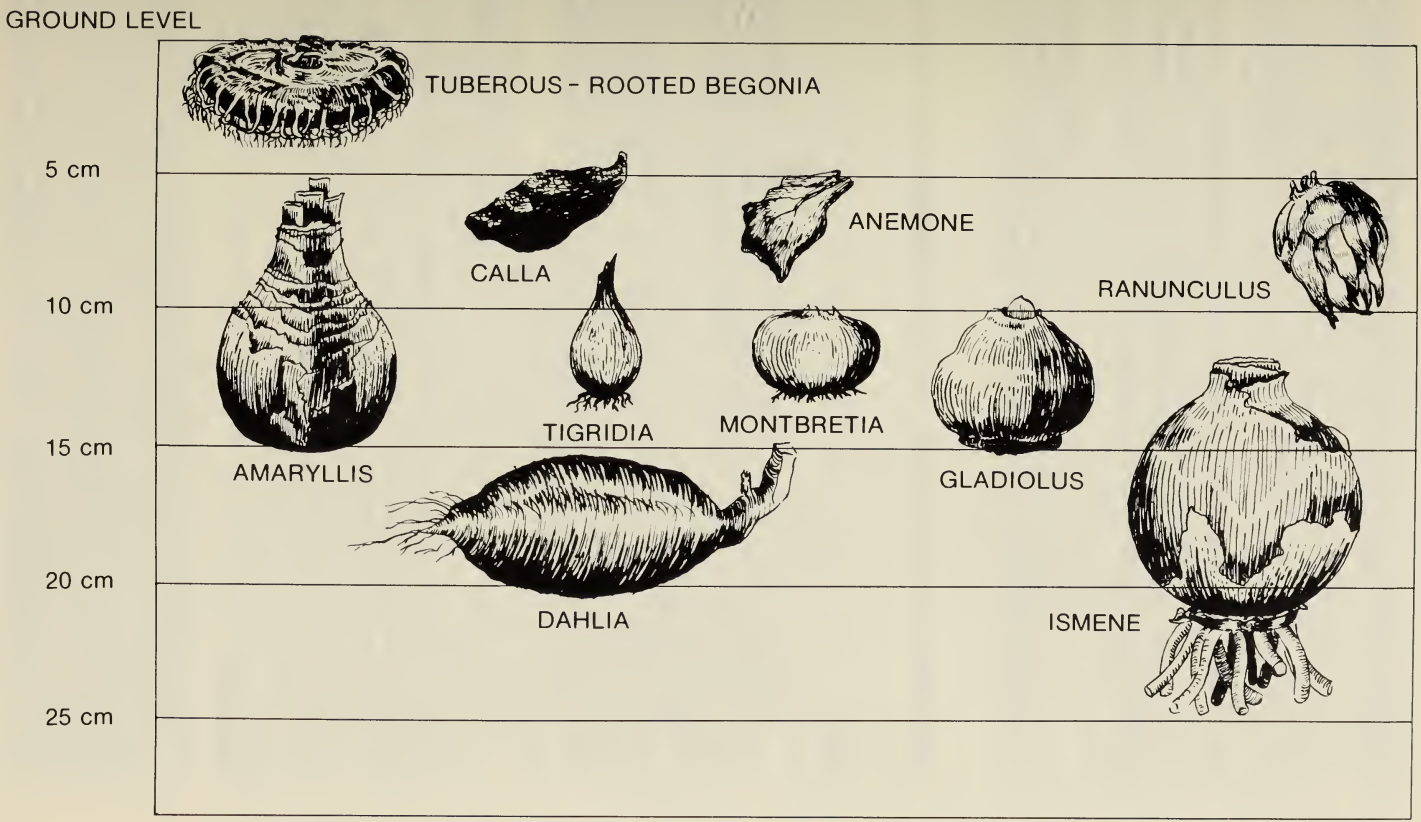
CLASSIFICATION OF BULBS FOR GARDEN USE

For Canadian gardens, bulbs are classed as either hardy sorts that can be left in the ground over winter or tender ones that must be lifted in the fall

PLANT IN FALL



PLANT IN SPRING



and stored indoors. The climate of Canada is so varied that the ratings for Ottawa, used in this publication, do not apply in all areas. For example, daffodils are generally hardy at Ottawa but not on the prairies; and the florists' anemone, which has to be lifted and overwintered indoors in Ottawa, can be left in the ground in southern British Columbia and in the Lake Erie district.

Most hardy bulbs bloom in the spring but a few, such as fall crocus, bloom later. Unless otherwise directed, plant them in the fall, at least 4 weeks before the ground freezes, so that the roots can become established. Winter damage is more severe to bulbs planted after October 15 than to those planted before September 15, according to tests at Ottawa and at Morden, Man.

Tender bulbs bloom during summer or fall. Plant them when the risk of frost is past, usually between May 15 and June 1 at Ottawa. Lift them in the fall as soon as the tops turn brown or have been wilted by frost.

GROWING, HARVESTING, AND STORING

Soil

In general, if drainage is good, bulbs do well in any average garden soil from light sandy loam to moderately heavy clay. However, they prefer a fairly open, fibrous loam that is neutral or slightly alkaline and contains nitrogen, phosphorus, and potash.

Provide adequate drainage. Although bulbs need plenty of moisture, it is useless to attempt to grow them in low spots that are wet in winter or spring. Before planting bulbs on land like this, provide drainage to carry the surplus water away. On clay soil, even with fair drainage, it is also a good idea to put some sand under the bulbs when planting them.

Improve the texture of poor soil. To lighten heavy clay, add sand and decaying organic matter. To keep light sand from drying out too quickly, add well-rotted leaf mold or old manure at 12-16 litres for each square metre of ground. Do this in the spring to improve the texture of the soil to be used for fall planting, and in the fall for spring planting.

Add limestone to soil that is too acid. If the pH of the soil is below 6.5, add limestone at a rate of 250 g/m² of ground for each 0.5 pH value needed to bring it up to 6.5. For example, if the pH is 5.5, add limestone at 500 g/m².

Fertilizer

Spring-flowering bulbs show little immediate response to fertilizer if the soil contains a reasonable amount of nitrogen, phosphorus, and potash. Since most dormant bulbs already contain the food supply for next year's plants, this is understandable. However, addition of fertilizer high in phosphorus and potash helps in the formation of better bulbs for the following year. Just before planting bulbs, dig in 5-10-13 fertilizer at about 250 g/m² of

ground; and in early spring scatter ammonium sulfate at 50 g/m² over the same area.

Light and water

Most bulbs prefer full sunlight if there is a good supply of water. However, it is not necessary to have full light throughout the season.

At Ottawa, watering spring-flowering bulbs immediately before and after the blooming period helps in the formation of larger bulbs. Light, scattered shade also helps; hardy bulbs do well under deciduous trees, particularly if the branches are high.

Most of the tender bulbs come from tropical climates, where heat is coupled with humidity. Some prefer full sunshine; others like some shade.

Insects and diseases

Insects and fungus and virus diseases attack bulbous plants. Protective measures need to be taken against them. For example, thrips, an ever-present pest of gladiolus, are controlled by spraying with an insecticide. Mildew on tuberous begonias is controlled by application of a fungicide.

Follow these four general precautions: (1) Practice clean cultivation. (2) Disinfect storage cellars, flats, etc., with a fungicide that will not injure the plants. (3) Dust bulbs in storage with a combined insecticide-fungicide. (4) Spray growing plants in the garden with a combination spray to control diseases and insects.

Brief notes on pests of specific plants are given in the following pages. For more information write to your provincial agricultural specialist.

Harvesting and storing

Bulbs that are not to be left in the ground through the winter should be lifted as soon as the foliage dies. For spring-flowering bulbs, this is usually about the end of June or early in July; for summer flowers, about the end of September or in mid-October.

Except for loosely constructed bulbs like lilies, let the bulbs dry thoroughly to avoid fungus rots. If the tops are green, cut them off short but not right above the bulb. When the bulbs are dry, clean off tops, roots, and old loose scales.

Discard all bulbs showing signs of disease or injury. Save healthy ones of normal size for replanting; and if desired, plant small bulbs in nursery rows for a year to increase in size.

Dust dry, tender bulbs with a fungicide. Store gladiolus bulbs dry but mix others with very slightly dampened sphagnum moss or vermiculite to prevent desiccation. Store at 5-10°C.

For further information, see publication 1276, *Storing bulbs.*

Propagation

Although commercial propagation of bulbs is not practical in most parts of Canada, you may propagate your own stock. Save the small divisions or offsets and cut-up tubers and plant them in rows to develop before planting them where they are to bloom.

COMMON HARDY BULBS

Chionodoxa luciliae Glory-of-the-snow. This is one of the most useful small bulbs in the border or under shrubs. Star-shaped, upward-facing blue flowers often appear when snow is still on shaded ground. They seed freely and form a thick, blue carpet if the grassy foliage is not cut. Height 10-15 cm.

There is also a rosy pink cultivar, *C. luciliae* 'Rosea'.

Colchicum Fall-crocus. Tall, coarse leaves appear in spring and look untidy when they fade. In September or October flowers appear without foliage. Plants may be left in the border for years, to form a thick clump. Flowers are fleeting, but keep on coming for a week or more. Plant bulbs in July or August.

C. autumnale Pale purple. Height 25-30 cm.

C. giganteum Deep rose with white center. Height 30-40 cm.

C. speciosum* var. *bornmuelleri Rose color. Large. Height 30-40 cm.

Convallaria majalis Lily-of-the-valley. The 15 cm spikes of fragrant white flowers appear in June. This plant makes a good ground cover in a poor-soiled, shady corner, where the thick carpet of dark green leaves persists for years. It does even better in rich, fibrous loam top-dressed each fall with well-rotted manure or leaves. When the bed becomes too thick, dig it up, manure the soil well, and replant the divisions.

Crocus Many crocuses are the so-called Dutch cultivars, available by name and in several colors. They prefer a well-drained soil, rich in humus, in full light. In a sunny, sheltered spot they will bloom as soon as the snow disappears. Use them in perennial borders or by paths in the rock garden and under shrubs. Plant the corms about 15 cm deep in September. Height 10-15 cm. The following have bloomed well at Ottawa:

Jeanne d'Arc: white

Peter Pan: white

Pickwick: white with blue stripes

Queen of the Blues: large-flowered, medium blue

Remembrance: purple

Sky Blue: heliotrope with a silvery sheen

Vanguard: early, light blue

Violet Vanguard: violet blue

Yellow Giant: early, large-flowered, yellow

Crocus biflorus Scotch crocus: white, with outer segments striped purple.

C. chrysanthus Many cultivars of this early-flowering species are now available, including:

Blue Pearl: silvery blue

E. P. Bowles: yellow with purplish feathering

Lady Killer: purple edged with white, white inside

Snow Bunting: white with purplish feathering

C. imperati Buff yellow, striped with purple.

C. sieberi There are several cultivars available and this species also forces easily.

C. tomasinianus Pale lilac, silvery gray outside; 'Whitwell Purple' is darker than the species.

There are many early-flowering species that flower well in milder districts, but these are often damaged by frost in Ottawa.

Interest is also expanding in fall-flowering *Crocus*, and of these the species *Crocus sativus* and *C. speciosus* are the most satisfactory. Treat them the same as *Colchicum*.

Daffodil See *Narcissus*.

Endymion hispanicus (Scilla hispanica) The Spanish bluebell blooms later (June), is much taller, and has broader leaves than the otherwise similar squills. The large flowers, in white and pink as well as blue, face upward. Height 40-45 cm.

E. non-scriptus (S. nonscripta) The English bluebell naturalizes beautifully in woodlands in the milder districts but is not quite hardy at Ottawa. The tubular blue bells hang downward. Height 30 cm.

Fritillaria This genus is closely related to *Lilium*, but most species bloom in spring.

F. imperialis Crown-imperial. This species has an unusual appearance for spring. The stiff, bell-like flowers, in colors ranging from yellow to red orange, are arranged around the top of a stout, leafy stem rather than a bare one. Allow bulbs to dry out only a short time and plant in the fall, about 15 cm deep in rich, well-drained soil. As the odor is unpleasant, do not plant near the house. Shift to a new location every few years. Height 60-90 cm.

F. meleagris Checkered or snake's-head lily. Nodding, bell-like flowers, on slender stems, bloom in May. They are checkered or spotted on the inside. The white ones are very attractive and the dull purple ones unusual. Plants have narrow, blue green foliage. Height 20-30 cm.

F. pallidiflora Yellow flowers bloom in May. Foliage is blue green. Height 30 cm.

F. pudica Yellow fritillary. Native of United States. Yellow, drooping flowers bloom in May and turn red as they age. Height 15-20 cm.

Galanthus nivalis Common snowdrop. These nodding flowers, white with green tips on three inner segments, are among the first to bloom after the snow melts. The plants prefer rich, moist but well-drained loam in part shade but will grow in most gardens. A double form is available. Height 15 cm.

G. elwesii This has slightly larger flowers and is taller than *G. nivalis*, but is not as easy to grow at Ottawa.

Hyacinthus orientalis Common hyacinth. Not reliably hardy at Ottawa; single types are a little hardier than doubles. For the garden, select second-grade bulbs, 15-18 cm in circumference. Plant them 15 cm deep in well-drained loam or clay loam soil. Plant early in September, as root growth is made in the fall. Mulch well with leaves or straw in early November. Natural increase is very slow so leave them in the same spot for several years, if desired. Some good cultivars are:

Carnegie, L'Innocence: white

Anna Marie, Lady Derby: light pink

Eros, Pink Pearl, Queen of the Pinks: pink

Delft Blue, Myosotis: light blue

Bismarck, Blue Jacket, Grand Maître, Ostara: blue

Amsterdam, La Victoire, Tubergen's Scarlet: red

City of Haarlem: yellow

Iris* ×*germanica garden or flag iris. This is the large June-flowering iris, hardy in much of Canada, which grows from rhizomes. When plants become crowded the bloom size decreases. Divide established clumps, or plant new ones, in late summer, so that they have time to make new roots before freeze-up. Late plantings should be mulched with leaves or straw to prevent frost heave.

Lift overgrown clumps and discard their centers. Select vigorous healthy-looking shoots and cut them off to leave about 10 cm of rhizome. Trim back the foliage to around 15 cm long to reduce water loss. Plant firmly with the roots on either side of a central ridge and the rhizome at soil level. Deep planting seems to encourage soft-rot disease.

There are hundreds of named varieties in a wide spectrum of colors, except bright red. The following have performed well under conditions at Ottawa:

Allegiance: navy blue

Argus Pheasant: soft brown

Black Taffeta: dark violet

Celestial Glory: golden orange

Centennial Gold: yellow

Cloud Capers: pink and white

Frontier Marshall: crimson lake

Heather Hawk: copper and white

Licorice Stick: blue black

Pacific Panorama: sea blue

Ribbon Round: white with light blue edge

Winter Olympics: pure white

A new race of iris that blooms again in the fall is gradually becoming available. Although many of these only rebloom in warm climates, the following have been reliable at Ottawa:

Autumn Snowdrift: white

English Cottage: pale blue

Fall Primrose: bright yellow

Lovely Again: blue violet

September Gleam: yellow tinged with pink

Leucojum Snowflake. These resemble snowdrops, but the flowers are larger and several grow on one stem. Plant the small bulbs in September or October. They may be left where you plant them for several years.

L. aestivum Summer snowflake. Blooms in May or June. Height 30 cm.

L. vernum Common snowflake. Blooms in April or May. Height 25-30 cm.

Lilium Lily. True lilies are among the finest of garden flowers. Some species are difficult to grow; others grow well if healthy bulbs are planted. Unfortunately, lilies are subject to certain diseases. Because one diseased plant can infect many healthy ones, new lily bulbs should first be grown in a special bed away from other lilies.

Lilies do well in a variety of garden soils but good drainage is essential. The soil should be well prepared before planting because they do best if left undisturbed for several years. When making a new bed, dig out the soil to a depth of about 50 cm, put several centimetres of well-rotted manure or leaf mold in the hole and replace the soil. In place of manure or leaf mold you may use a commercial fertilizer such as 5-10-13 at 200 g/m^2. To lighten very heavy soil, add coarse sand or fine cinders, and to improve light sandy soil add good loam and humus. Before planting lily bulbs in a perennial border, dig holes about 50 cm deep and 30 cm or more wide; mix the soil with leaf mold or peat moss, and refill the holes.

Always plant lily bulbs before the ground freezes. The depth to plant them depends on the species, the size of the bulb, and the texture of the soil. If the bulbs produce roots only at the basal part, plant 10-15 cm deep. If they form roots along the stem as well, plant 20-25 cm deep. Plant large bulbs deeper than small ones.

If imported bulbs arrive too late for outdoor planting, pot them in slightly moistened soil and keep in a cool cellar until spring; or pack in damp sphagnum moss and store at a temperature just above freezing.

In recent years plant breeders have developed new and improved lilies through hybridization. Many of these hybrids are now on the market and more are added to the catalogs every year. Most lily catalogs now follow the classification system recognized by the Royal Horticultural Society and by the North American Lily Society. The following list contains some of the better hybrid lilies now available:

Division 1. Asiatic hybrids

So called because of their derivation from plants found wild in Asia

1a. Upright flowers

Destiny: yellow

Enchantment: brilliant orange red

Polar Bear: white with purple markings

Rainbow Hybrids: mixed, yellow to deep red

1b. Outward-facing flowers

Connecticut Lemonglow: bright yellow

Earlibird: apricot

Firebright: currant red

Pink Champagne: yellow overlaid with pink, later-flowering

1c. Pendent flowers

Harlequin: mixed, white through lilac to purple

Red Knight: deep red

Sunbright: bright yellow

Division 2. Martagon hybrids

Brocade: orange yellow

Hardly any others offered for sale

Division 3. Candidum hybrids

Rarely available

Division 4. Hybrids of American species

Miranda: yellow

Nightingale: old rose and white

Red Bird: deep red

Division 5. Longiflorum hybrids

Rarely available

Division 6. Hybrid trumpet and Aurelian lilies

6a. Trumpet type

Black Dragon: inside white, outside purple brown

Green Magic: white with green center

Limelight: yellow

6b. Bowl-shaped

Rarely available

6c. Pendent type

Rarely offered

6d. Sunburst type

Cayuga: cream with orange center

Ming Yellow: bright yellow

Thunderbolt: orange

Division 7. Oriental hybrids

7a. Trumpet types

Rarely available

7b. Bowl-shaped

Chinook: salmon

Magic Pink: shell pink

Red Band Hybrids: white with a crimson stripe on each petal

7c. Flat flowers

Imperial Crimson, Gold, Pink, Silver: a large-flowered strain available in individual colors or as a mixture

7d. Recurved flowers

Jamboree: crimson with darker spots

Journey's End: crimson with white tip

Division 8. Other hybrids not included in Divisions 1-7

Rarely available

Division 9. True species and their forms

The following are some of the better known species:

Lilium canadense: native to Eastern Canada

L. candidum: the very popular white madonna lily

L. hansonii: the orange yellow recurved Hanson's lily

L. pensylvanicum: the old-fashioned orange red candlestick lily

L. regale: regal lily, a fragrant favorite in many gardens

Muscari armeniacum Grape-hyacinth. The small blue flowers, shaped like inverted urns, are arranged in a tight spike. They bloom in May and June. The leaves grow in the fall and should be left undisturbed over winter. The plants seed freely. When the clumps become too thick, dig the plants in July and replant them. A good location is at the front of the border or in the rock garden,

either in sun or in part shade. There are several cultivars, obtainable in different shades of blue. Height 18-22 cm.

Narcissus Daffodil. At one time narcissus and daffodil were both used as common names, but daffodil now covers them both. These bulbs are not hardy in all parts of Canada. At Ottawa they have been destroyed in about two winters out of forty. They prefer a deep, well-drained soil, rich in humus, with bone meal and wood ashes, but no raw manure, added. They do well in sun or part shade and you can leave them undisturbed for several years, or until the clumps become overcrowded and the flowers small.

When this occurs, dig the bulbs after the foliage turns brown, dry them and store in a cool, airy place until August. Divide and clean the clusters of bulbs. Plant large ones in the border and small ones in rows where they should develop into flowering-size bulbs in a year or two. In a large border, clumps of 15 or 20 bulbs are effective; in a small border it is better to use no more than five in each clump. Plant new bulbs, as soon as they are available, 25 cm deep and 15-20 cm apart, depending on size. Large drifts of daffodils, naturalized in open woodland or fields, look striking in the spring. You can use the inexpensive cultivars for this purpose.

Because there was so much confusion about the different types of narcissus, in 1949 the Royal Horticultural Society introduced a new classification system consisting of 11 divisions. The narcissus of Divisions 1 to 9 are all of garden origin. Divisions 1, 2, and 3 have subclasses based on color. Divisions 5, 6, and 7 have subclasses based on length of corona. A few cultivars are recommended here under each division.

Division 1. Trumpet narcissus

One flower per stem; corona (trumpet or cup) as long as the perianth segments (petals surrounding the corona) or longer

1a. Perianth colored; corona not paler than the perianth

Bastion, Cromarty, Dutch Master, Golden Harvest, King Alfred, Magnificence, Rembrandt, Unsurpassable, William the Silent, Youth

1b. Perianth white; corona colored

Music Hall, Oliver Cromwell, Queen of the Bicolors, Trousseau

1c. Perianth white; corona white

Beersheba, Broughshane, Cantatrice, Mount Hood, Roxane

Division 2. Large-cupped narcissus

One flower per stem; cup more than one-third as long as the perianth segments, but shorter than the segments

2a. Armada, Bermuda, Carbineer, Carlton, Ceylon, Fortune, Red Rascal, Scarlet Elegance, Tinker

2b. Dick Wellband, Duke of Windsor, Flower Record, Ice Follies, John Evelyn, Mount Tacoma, Mrs. R. O. Backhouse, Pink Fancy, Pink Rim, Selma Largerlof

2c. Gentility, Jules Verne

Division 3. Small-cupped narcissus

One flower per stem; cup not more than one-third as long as the perianth segments

3a. Bath's Flame, Birma, Chungking

3b. Barrett Browning, Edward Buxton, Firetail, La Riante, Limerick, Mystic, Snow Princess, Verger

3c. Polar Ice

Division 4. Double narcissus

Golden Ducat, Inglescombe, Texas, White Lion

Division 5. Triandrus narcissus

Narrow, rushlike leaves; one to six flowers per stem

Liberty Bells, Silver Chimes, Thalia, Tresamble

Division 6. Cyclamineus narcissus

Solitary, drooping flowers with reflexed perianth segments

Charity May, February Gold, Peeping Tom, Tête-à-Tête

Division 7. Jonquilla narcissus

Tall, rushlike foliage; flowers have a wavy-edged cup and are borne two to six on a stem

Baby Moon, Golden Goblet, Golden Sceptre, Trevithian

Division 8. Tazetta narcissus

Recognized by the many small flowers on each stem, and wider foliage. The so-called paperwhite and Soleil d'Or narcissus belong to this group but are tender and are grown only indoors or in greenhouses. The bunch-flowered Poetaz cultivars (hybrids from Poeticus and Tazetta) are grown outdoors

Early Perfection, Geranium, Orange Wonder, Silver Chimes; and the double forms: Cheerfulness, Yellow Cheerfulness

Division 9. Poeticus narcissus

White perianth with very flat, short, lemon-colored cups, rimmed orange or scarlet

Actaea, Red Rim, Sarchedon

Division 10. Species, wild forms, and their hybrids, including all species and reputedly wild forms and hybrids not of garden origin

N. bulbocodium, N. juncifolius, N. obvallaris (lobularis), N. minor var. *minimus, N. triandrus* var. *albus, N. watieri,* April Tears, Dove Wings

Division 11. Miscellaneous narcissus

Includes all forms that do not fall into any of the other 10 divisions.

Ornithogalum umbellatum Star-of-Bethlehem. The bright green foliage appears so early, and the umbels of white, star-shaped flowers last so long in May, that this species is well worth planting, particularly beneath shrubs. It grows vigorously and seeds freely, and is apt to become a weed when used in the border or rock garden. Plant 5 cm deep. Height 30 cm.

Puschkinia scilloides* var. *libanotica Striped-squill. This is a very useful small bulb for the rock garden or front of a border. The dense spikes of grayish blue, bell-like flowers last well in April or May. They may be left for several years and seed freely if not cultivated. Height 15 cm.

Scilla Squills are easy to grow in sun or shade. They seed very freely. If left alone they make a thick carpet of blue, hanging bells under shrubs in April or May.

S. hispanica (campanulata) See *Endymion hispanicus*.

S. nonscripta (nutans) See *Endymion non-scriptus*.

S. sibirica The Siberian squill is the species most commonly grown. The individual flowers are larger than those of the English bluebell (*Endymion non-scriptus*), and there are fewer per stem. 'Spring Beauty' is darker than the species. Height 15 cm.

S. tubergeniana Tubergen's squill is lighter in color than the more common Siberian squill, with each petal having a darker stripe down its center. Several 12 cm spikes are produced by each bulb.

Trillium Native to many parts of Canada, trilliums grow in leafy, well-drained soil and bloom in May. They do well in a flower border and will spread from seed. Transplant in summer after the foliage dies down. There are three common species:

T. erectum The purple trillium has a disagreeable odor. Height 22 cm.

T. grandiflorum The large white trillium is most common. Flowers turn pink as they fade. Height 45 cm.

T. undulatum The painted trillium has smaller flowers with a band of pink. This is harder to establish in gardens. Height 30 cm.

Tulipa Tulip. Probably more tulip bulbs are sold in Canada each year than all other bulbs combined. With such diversity and brilliance of color, they have a place in almost any garden. The single and double early tulips are most useful for formal beds, where they can be interplanted in June with annual flowers. The taller cottage, Darwin, and other late-flowering kinds are most useful in the perennial border, where their dying foliage in June can be hidden by other vigorous plants. Many of the true species of tulips are early-flowering and shorter and make suitable subjects for planting in a rock garden.

Tulips grow best in well-drained, medium sandy loam that has been enriched with well-rotted manure a few months before planting. Good bulbs flower in any well-drained soil, but quickly deteriorate in poor soil after the first

year. To avoid this, apply 5-10-13 fertilizer at 250 g/m² just before planting bulbs in the fall, and follow with a light application of a nitrogen fertilizer in the spring. Plant bulbs in September or early October as they may be heaved up and damaged by frost if not well rooted before the ground freezes.

Where bulbs are to be lifted each year after blooming, plant 12-15 cm deep. If they are to be left in the ground for more than one year, plant 20-25 cm deep. At the greater depth the bulbs increase more slowly and are not crowded as soon.

When tulips are to be replaced by annual flowers, dig them up about June 1 but do not remove tops and roots; place the plants upright in a trench 15 cm deep, heel them in (cover the roots with soil) and leave until the tops turn brown, about July 1. Then dig again, remove tops and loose soil, and store the bulbs in shallow boxes in a warm, dry place. When dry, clean and sort for size. Bulbs over 2 cm in diameter will probably flower the next year, so in early fall replant these where you want them to bloom. Plant smaller ones in rows in the kitchen garden to develop.

Tulips are susceptible to a disease caused by the fungus *Botrytis tulipae*. The first sign of this is a scorched tip on the shoot when it emerges early in the spring. Later the foliage shows brown tips or blotches and gray brown flecks rapidly develop on the flowers and cause them to "flop." There is no cure. To keep the disease from spreading, remove and burn affected bulbs as soon as the symptoms are noticed. As a precaution, spray with a fungicide just as the buds are appearing above the leaves, and again after the bloom is over. Also, pick off faded blooms before they fall, as they may spread the disease.

Tulips are now classified in four principal divisions. Divisions 1, 2, and 3 are each subdivided into groups or kinds according to shape, habit, and parentage. Division 1 is the early-flowering division and contains just two kinds, single early and double early tulips. Division 2 is classified as the midseason-flowering division and contains the Mendel, Triumph, and Darwin hybrid kinds. Division 3 is probably the largest and most popular division; it has the following subdivisions: Darwin, lily-flowering, cottage or single late, Rembrandt, Parrot, and double late tulips. Division 4 comprises the true *Tulipa* species, cultivars, and hybrids; it is subdivided into *Tulipa kaufmanniana, T. fosteriana, T. greigii*, and a fourth class that includes many other species, cultivars, and hybrids. There is much intercrossing of species and cultivars, so it is still difficult for an amateur gardener to identify to which group a particular tulip cultivar belongs.

There are many hundreds of named cultivars registered and new cultivars are introduced each year. The following list of cultivars recommended for the Ottawa area in 1980 is arranged according to the current classification.

Early-flowering division

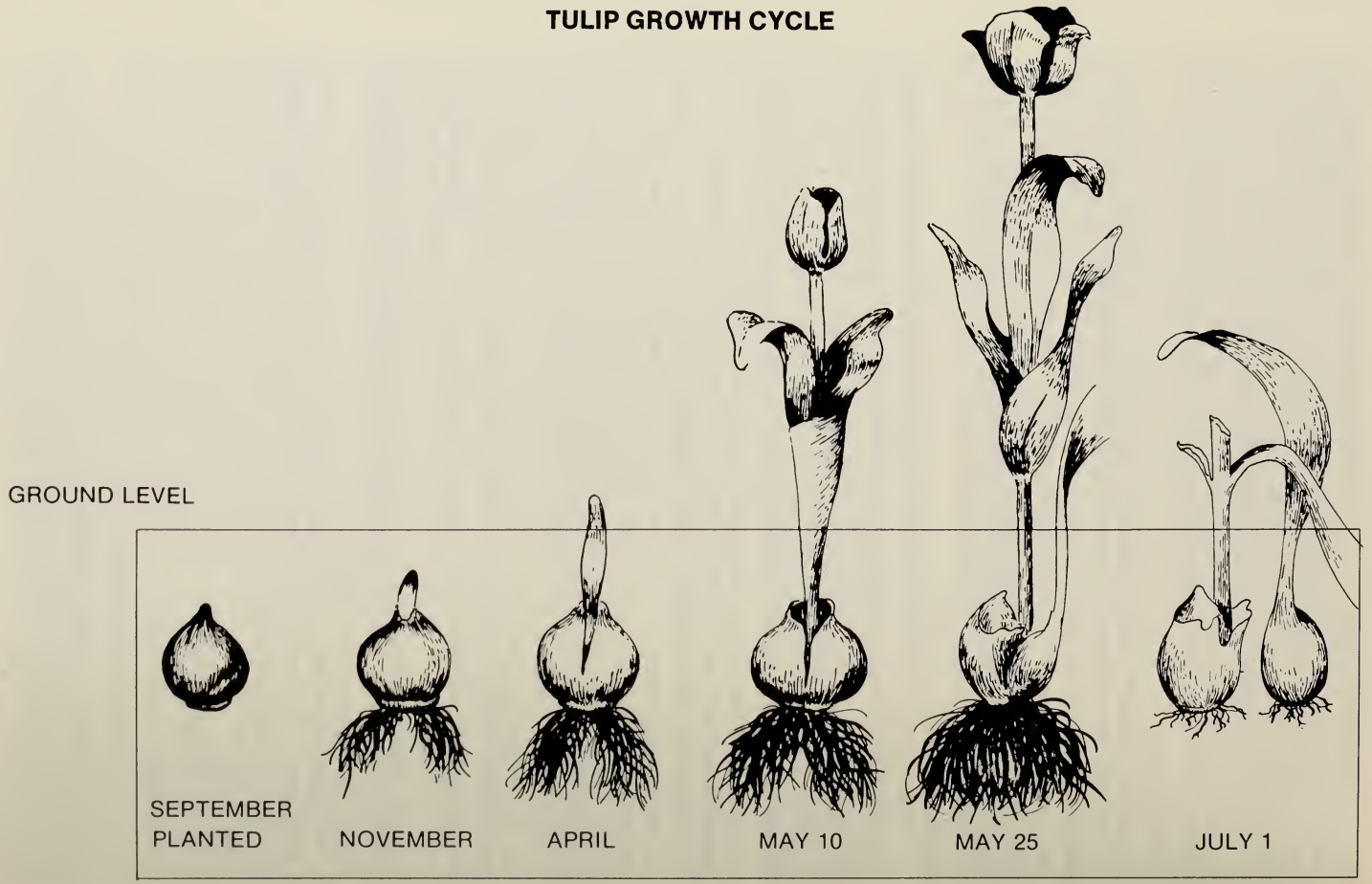
1. Single early tulips

Bellona: yellow, fragrant

Couleur Cardinal: scarlet

Generaal de Wet: orange and gold, fragrant

TULIP GROWTH CYCLE



Keizerskroon: red edged with yellow
Prince of Austria: orange scarlet, fragrant
Prins Carnival: red with yellow interior, fragrant
Prinses Irene: orange and bronze
Sunburst: gold striped with carmine
White Hawk: white

2. Double early tulips
Carlton: deep red
Maréchal Niel: yellow orange
Mr. van der Hoef: yellow
Oranje Nassau: scarlet edged with orange
Peach Blossom: pale pink
Schoonoord: white
Stockholm: dark red
Willemsoord: red edged with white

Midseason-flowering division

3. Mendel tulips
Apricot Beauty: salmon to pink
Krelage's Triumph: rose red
Bestseller: bright copper
White Sail: white

4. Triumph tulips
Bing Crosby: scarlet
Blizzard: creamy white
Dreaming Maid: lilac edged with white
Garden Party: white and pink bicolor
Kansas: white with yellow base
Kees Nelis: red edged with orange
Orange Wonder: light orange
Paul Richter: red
Tambour Maître: cardinal red

5. Darwin hybrid tulips
Beauty of Apeldoorn: golden yellow flushed with orange red
Elizabeth Arden: red pink flushed with carmine
Golden Apeldoorn: golden yellow

Gudoshnik: yellow and red flamed with rose

Jewel of Spring: sulfur yellow spotted with red

Oranjezon (Orange Sun): orange

Oxford: scarlet flushed with red

President Kennedy: yellow spotted with red

Red Matador: bright scarlet

Late-flowering division

6. Darwin tulips

Aristocrat, Demeter, Georges Grappe, Scotch Lassie (scented): violet to purple

City of Haarlem, Flying Dutchman, Most Miles, Scarlett O'Hara: scarlets and reds

Perry Como, Pink Supreme, Queen of Bartigon: roses and pinks

Niphetos, Sunkist, Sweet Harmony: yellows

Glacier, Swan Wings, Zwanenburg: whites

Queen of Night: dark maroon

7. Lily-flowered tulips

Aladdin: orange red

China Pink: pink

Dyanito: red

Golden Duchess: yellow

Mariette: pink

Maytime: red violet

Queen of Sheba: brownish red edged with orange

Red Shine: dark red

White Triumphator: white

8. Cottage or single late tulips

Asta Nielsen, General Ridgeway, Golden Harvest, Golden Wedding, Mrs. John T. Scheepers: yellows

Dillenburg: orange red

Halcro, King's Blood, Marshall Haig: reds and scarlets

Mirella, Renown, Smiling Queen: pinks

Maureen: white

9. Rembrandt tulips (includes former broken tulips)

This group is not well represented in Canadian gardens

10. Parrot tulips

    Blue Parrot: violet blue flushed with bronze

    Karel Doorman: cherry red

    Orange Favorite: orange with green blotches, fragrant

    Texas Flame: yellow flamed with red

    Texas Gold: golden yellow edged with red

11. Double late tulips (sometimes known as peony tulips)

    Bonanza: red edged with yellow

    Clara Carder: tyrian purple and white

    Eros: rose pink

    Mount Tacoma: white

    Orange Triumph: orange red

    Uncle Tom: white

Tulip species division

12. *Tulipa kaufmanniana*, cultivars and hybrids (the water-lily tulip)

    Caesar Franck: yellow and carmine

    Daylight: deep glowing red

    Shakespeare: pale pink flushed with red

    Stresa: yellow and red

    The last two have spotted or mottled leaves like *T. greigii*, and are hybrids between *T. kaufmanniana* and *T. greigii*. Height 20-30 cm.

13. *Tulipa fosteriana*, cultivars and hybrids

    Cantata: brillant red

    Easter Parade: yellow and red

    Purissima: white

    Red Emperor: fiery red with black and yellow base, early-flowering

    The blooms in this group are early-flowering, very large, and 40-50 cm in height.

14. *Tulipa greigii*, cultivars and hybrids

    Cape Cod: apricot pink edged with yellow, height 20 cm

    Margaret Herbst: vermilion red, large-flowered, height 40-45 cm

    Oriental Beauty: vermilion red, height 20-25 cm

    Red Riding Hood: bright scarlet, height 20 cm

    All the *T. greigii* tulips have striped or mottled leaves of a strong reddish purple color, which fades as the sun's light gets brighter.

Other *Tulipa* species useful in the garden are:

Tulipa clusiana (the lady tulip): cream and rose, small-flowered, height 10-30 cm

T. eichleri: scarlet flowers on slender stems, height 25-30 cm

T. praestans 'Fusilier': scarlet orange with three to five blooms per stem

T. sylvestris: yellow, sweetly scented, slender stems, height 35-40 cm

T. tarda: yellow and white, star-shaped, flowering profusely and increasing rapidly, height 8-12 cm

COMMON TENDER BULBS

The flowering plants in this group grow from tubers or corms that need to be stored indoors over winter. The information given here is of a general nature. Those desiring to specialize in dahlias and gladiolus may obtain further information from sources such as the yearbooks of the Canadian Chrysanthemum and Dahlia Society or the Canadian Gladiolus Society, or obtain a copy of *Growing Gladiolus*, Publication 1229, from Information Services, Agriculture Canada, Ottawa, Ontario K1A 0C5. For those who wish to grow begonias, *Tuberous Begonias*, Publication 1335 of Agriculture Canada, is also available from Information Services. Addresses of some flower societies are listed toward the back of this publication.

Begonia Tuberous begonias make excellent bedding plants in part shade. They also do well in window boxes or hanging baskets on the east side of a building, or even on the north, if they receive full daylight. They do not grow well in deep shade.

Begonias prefer open, fibrous sandy loam soil that has good drainage yet plenty of moisture. They can be grown in heavier soil if a liberal dressing of peat and sand is dug into the bed. They are quickly burned by drought or strong sunshine.

Heavy, balanced feeding pays well in larger, continuous bloom. Use either well-rotted manure at 12-16 litres/m^2 of ground, or a handful of dried sheep manure and 15 mL of dried blood beneath each plant, to provide the needed stimulus.

Buy begonia tubers, 3-5 cm in diameter, in March. Ask for the pendulous type if you want them for window boxes or baskets. Although most gardeners are usually willing to pay a higher price for the large-flowered camellia or fimbriated type of begonia, it is best to begin with less expensive ones.

If you have a greenhouse, a hotbed, or even a bright east window, about March 15 start the tubers by placing them in flats of moist peat moss with their tops level with the surface.

Be sure the indented or hollow side is up and the rounded side, which forms the roots, is down. Place the flats in subdued light, at a temperature of 21-27°C, until growth is well started. Then pot the tubers separately into 10

cm pots filled with sandy loam and place in bright daylight or beneath light cheesecloth shade in a greenhouse.

Although it is a good idea to let the begonias sprout in peat moss, you may have no suitable place for the flats. If so, wait until April 1 and plant the tubers in pots filled with earth. You can grow these in a basement window and put the plants outside on warm days to harden them.

Set the plants in garden beds after all risk of frost is past, about June 1. Place the plant with the tuber 3 cm below the surface and with the lower leaf pointing to the outside so that the flowers will face outward.

Begonia plants are attacked by small insects and by the fungus disease powdery mildew, which forms white, dusty-looking spots on the leaves. To control insects use an approved insecticide; to guard against mildew, spray or dust with an approved fungicide.

Dig the tubers immediately after the first frost. Leave on all or part of the tops and spread the plants out in a warm room away from sunlight to dry thoroughly. After a week or two, break off the tops and fibrous roots and pack the clean tubers in very slightly moistened sawdust, peat moss, or vermiculite. Store at 5-10°C.

Canna This subtropical plant, so popular in Victorian gardens, is used in many public gardens and parks. It is also finding favor with owners of homes with large open lawns where a splash of exotic color is needed to complete the decor. The broad, handsome purplish bronze or green foliage, together with large orange, pink, scarlet, or yellow flowers, creates a striking note for a bold planting. The introduction of new dwarf hybrids in a good color range also makes the canna a more acceptable plant for garden ornamentation.

Although the plants can be raised from seed (by soaking overnight in warm water and starting early in February in a warm greenhouse), the usual practice is to buy roots (tubers) or started plants from a nursery or florist.

Pot tubers in good sandy loam soil about April 15; or start them sprouting in flats of peat moss or vermiculite and then pot, as outlined for begonias. Cannas need heat and moisture to start growth but need no light at first. After the tubers sprout, place the plants in a greenhouse or near a bright window. Early in May transfer to a cold frame or other outdoor sheltered spot where they can be protected from frost. In late May or June, plant 45-60 cm apart in a sunny spot in the garden. These large, vigorous plants love heat and moisture; water them liberally in hot weather.

In the fall, when frost has damaged the plants, cut off the tops at ground level; dig the tubers, turn them upside down, and leave them for a few hours to dry a little. Then put them in an airy room for several days to dry, but not shrivel. Pack in boxes of sand or vermiculite to prevent drying and shrinking. Store in a frost-free cellar at 5°C. Canna tubers must not be kept wet but, if the atmosphere is very dry, occasionally sprinkle the sand or vermiculite with a little water.

In late March or early April, unpack the tubers and divide so that each division has several good eyes (buds). Pot each division as outlined above.

Some good cultivars are:

With green leaves

City of Portland: salmon pink flowers

President: scarlet red flowers

R. Wallace: yellow flowers

Yellow King Humbert: yellow flowers speckled with red

With purplish bronze leaves

Ambassador: red flowers

Mrs. A. Conard: salmon pink flowers

Red King Humbert: orange scarlet flowers

Wyoming: orange yellow flowers

The newer dwarf Pfitzer hybrids grow to about 100 cm in height and are available in colors of Chinese coral, cherry red, salmon pink, and primrose yellow.

Dahlia Dahlias have been popular garden plants for more than 100 years. Because of this interest hybridizers have developed many different types. Home gardeners still grow the large-flowered cactus and decorative dahlias, and these can be seen at fall flower shows and exhibitions. Because of garden space limitations, many gardeners now grow the dwarf, small-flowered types. Some of these may be grown from seed, sown indoors in February or March to flower outdoors in July. Dahlia specialists list numerous types and cultivars, which are augmented by new introductions each year. This makes it difficult for local garden centers to carry any more than a few popular cultivars.

The American Dahlia Society classifies dahlias into the following types: formal decorative, informal decorative, straight cactus, semicactus, incurved cactus, ball, miniature ball, pompon, anemone, peony-flowering, collarette, mignon, orchid-flowering, miniature, and single.

The type classes are further divided according to bloom size: large flowers, indicated in catalogs by (A), are over 20 cm in diameter; (B) indicates medium size, over 15 cm through 20 cm; (BB) is for florist's size, over 10 cm to 15 cm in diameter; (M) indicates miniature, not more than 10 cm in diameter. Most catalogs also indicate the approximate heights of the plants and how early or late they bloom.

Cactus-type dahlias have tubular or rolled petals. The group is subdivided into straight cactus, semicactus, and incurved cactus; these terms indicate how much of the petal is rolled, or that the tips curve inward.

The formal decorative dahlias have flat, regularly arranged petals, whereas the informal decorative type has petals that are less regularly arranged.

The cactus and decorative types of dahlias are also subdivided by size into large, medium, small, and miniature.

Ball-type dahlias have rounded blooms with compact, blunt petals and the blooms are over 10 cm and up to 15 cm. Pompon dahlias have small

rounded blooms under 5 cm.

Dwarf dahlias are also available with both single and double flowers; the anemone, collarette, mignon, orchid-flowering, and peony-flowering types are dwarf plants that differ mainly in the form of their flowers.

Dahlias need plenty of moisture and grow best in rich, open, well-drained soil. They are heavy feeders and benefit from well-rotted manure, if available. It should be dug into the bed in the fall of the year before planting. A fertilizer high in phosphorus and potash may be worked into the soil surface at 3-week intervals during the early part of the growing season. Too much nitrogen tends to produce soft growth with few flowers.

Each dahlia tuber must be attached to a piece of the old stem on which there is an eye or growing bud. Tubers rot quickly in cold, wet soil; do not plant them until the soil is warm, in late May or June.

If you want plants to bloom early, start them indoors about the first of April. Fill a deep, flat box with sandy loam soil; lay the tubers on their sides with the buds pointing upward and cover with 3-5 cm of soil. Water well and place the box in a warm location until growth starts. After April 15, move to a sheltered spot outside and cover on cold nights; plant in the garden when the risk of frost is over.

For planting, dig a hole 15 cm deep and loosen the soil well on the bottom. Lay the tuber on its side with the shoot pointing upward. Place a stake in the ground, about 10 cm from the shoot, while it can be driven down without doing any damage. Then cover the tuber with 5-10 cm of earth and pack firmly. As shoots appear, pinch off all but the strongest one and fill the hole with earth gradually as the shoot grows. Do not mound the earth as this sheds moisture away from the roots.

To conserve soil moisture, cultivate so that there is a dust mulch or add a mulch such as shavings or chopped straw. When watering is necessary, soak the earth thoroughly; light, frequent sprinkling keeps the roots close to the surface, and plants suffer quickly when watering ceases.

The large-flowered and tall cultivars need staking with a wooden or steel-rod stake 150-200 cm long pushed into the ground for 30-40 cm. Tie the main stem of the plant to this, every 30-40 cm, using raffia or strips cut from old nylon stockings. First, tie loosely around the plant and then tightly around the stake, to make a figure eight; then make a second loop around each. Later on, make longer loops to support side branches, keeping in mind that the plant should not look stiff.

If you are growing dahlias for exhibition, prune and disbud the plants to increase size and quality of blooms and to ensure straight stems. As soon as the plant is staked, start removing side shoots in the axils of the leaves. For extremely large blooms, grow the plant to a single stem with all side shoots removed. In most cases, only thinning out is required. To do this remove the side shoots from the lowest pair of leaves; leave the shoots in the axils of the next pair and of two higher up, so that the plant will have four laterals and a terminal stem. Tie the four laterals loosely to the stake and pinch off all extra side shoots. A cluster of buds will form at the end of each branch. As the center bud in each cluster develops to 1 cm in diameter, remove all the side

buds. This method of pruning and disbudding produces five flowers on a plant; other methods may be followed, according to the number of flowers desired.

The dahlia's chief enemies are hot, dry weather and insects, particularly European earwigs, leafhoppers, and tarnished plant bugs. Watering, mulching, and shading at midday help to combat the former. To control insects, dust or spray with an approved insecticide.

After frost has damaged the tops, cut them down to about 15 cm above ground level. Leave in the ground for a further week or so unless very heavy frosts are forecast. This gives the dormant buds time to swell and become visible, an aid when you divide the tubers. Dig the roots carefully, so as not to damage the tubers, and leave them upside down for a few hours to drain off surplus moisture. When partly dry store over winter in a frost-free cellar at 5°C, with good humidity; or pack in slightly dampened peat moss or vermiculite.

Most growers divide the tubers in the fall. To do this, cut the "crown" or stem in such a way that each tuber is connected by its neck to a section of the stem that has a growing bud or eye; discard tubers that have no eye attached.

Cultivars in the following list are a small proportion of those obtainable from the specialist grower. They are, however, the best of the dahlias generally available.

Formal decorative

- Alva's Supreme: soft yellow
- Croydon Masterpiece: bronze flushed with red
- Duet: red with white tips
- Gerry Hoek: pink
- Kidd's Climax: yellow blushed with violet
- Vera Seyfang: orchid pink

Informal decorative

- Holland Festival: orange with white tips
- Lavengro: rosy lavender
- Tartan: maroon tipped with white

Straight cactus

- Doris Day: cardinal red
- Hit Parade: fiery red
- Juanita: ruby red

Semicactus

- Apache: red
- Golden Heart: flame red with gold at petal base
- Hamari Bride: clear white

Mme Clementine Andries: light orange

Incurved cactus

Nagel's Solidite (Nagel's Solitude): pink

Nutley Sunrise: burnt orange

Purple Gem: purple

Ball

Dottie D: lavender and white bicolor

Gold Ball: buff yellow tipped with red

Hulin's Carnival: white splashed with purple

Miniature ball

Dr. Grainger: golden bronze

Nijinsky: rich purple

Rothesay Superb: bright red

Pompon

Amusing: orange

Fuji: gold

Little Mathew: dark red

Little William: purple tipped with white

Magnificat: bright orange

Dwarf (staking not needed)

Border Princess: salmon bronze, double

Lilian Ballego: orange tipped with bronze, double

Park Delight: pure white, miniature

Park Princess: bright pink, double

Park Record: deep orange, miniature

Gladiolus Though not hardy enough to survive our winters when left in the ground, the gladiolus has rapidly become one of our most popular plants. It is showy, multiplies rapidly, and will grow on any average garden soil. However, with its popularity have come several diseases and an insect pest that make it more difficult to grow than many other flowers.

Gladiolus may be planted in groups in a perennial border but they are better grown in rows, in a sunny location. They prefer a well-drained, well-enriched sandy loam soil but grow satisfactorily on well-drained clay loam. If possible, prepare the soil the year before growing gladiolus, by digging in a liberal 5 cm dressing of well-rotted manure or leaf mold. Never use fresh manure. Leave the soil heaped up roughly in furrows, so that it will benefit from the action of frost during the winter. In the spring, level the land roughly and dig in 5-10-13 fertilizer, 500 g for each 10 m of row, before planting the gladiolus corms.

The date to plant varies with the local climate and the desired blooming time. For most of Canada the best time is between May 15 and 20, but in mild districts earlier planting is satisfactory. In some northern districts the corms should be sprouted indoors in flat boxes filled with moist sand and not planted outdoors until June 1. Early cultivars of gladiolus bloom about 75 days after planting; late ones, 100 days.

Plant only corms that are free from diseases. Plant corms 12 cm deep and 15 cm apart in a double staggered row. When planting more than one row, be sure to leave enough space between them for cultivation.

Practice clean cultivation all summer to keep down weeds and conserve moisture. Apply water liberally once a week in dry weather. On light soil you may have to stake plants to hold them upright in the wind. A good way to do this is to use 120 cm lengths of strong pipe or wooden stakes, each having two 15 or 20 cm crossarms placed 25 cm apart near the top of the stake. Drive the stakes into the row every 10 m so that the crossarms are 50 and 75 cm above ground. Finally, run two wires down each side of the row and attach to the crossarms.

Damage from the gladiolus thrips is now so common that spraying must be done frequently to control the insect. Begin spraying when foliage is 25-30 cm high, using an insecticide spray as directed on the container. Spray once a week until the time of bloom, and spray the foliage after the flowers are cut.

Several diseases attack the foliage and the corms. For diagnosis and control of these, contact your provincial agricultural specialist.

For home decoration, cut the spikes as soon as the first floret is fully open, so that all the others will open indoors. If you leave the flowers in the garden, cut the spikes off as soon as the flowers fade rather than allow them to go to seed.

In the fall, as soon as the foliage is browned by frost, cut it off just above the ground. Dig the corms on a warm, sunny day, and leave them on the ground for 2 or 3 hours; this makes it easier to remove the earth stuck to them.

Corms must be dried quickly to avoid mildew, which flourishes under cool, moist conditions. Spread the corms thinly over a flat surface—flat boxes with screen bottoms are ideal—and place in a warm, dry room that has good air circulation. When they are dry enough, remove all tops, roots, earth, and loose husks. Dust the corms with an approved insecticide dust mixed with a powdered fungicide to prevent damage during storage; follow the manufacturer's directions closely. After cleaning and dusting, store the corms and cormels over winter in shallow, open boxes at 5-10°C. Check them once or twice during the winter and remove dry husks and any diseased corms.

In the spring, soak the cormels overnight in warm water and sow like beans in a row in the garden. Some will develop into good corms the first year; others will take 2 years.

There are many excellent cultivars of gladiolus and lists of them are constantly changing. The following cultivars recommended in 1980 are likely to remain standard ones for some time. In this list, the letters in parentheses refer to the time of flowering: (ve) very early, (e) early, (em) early to midseason, (m) midseason, and (ml) midseason to late.

Large- and medium-flowered

Morning Bride (em), Superstar (em), White Friendship (ve): white

Green Bay (ml), Beret (m), Green Woodpecker (m): green

Landmark (ml), Merle Doty (m): cream

Banana Split (m), Jester (ml), Klondike (m), Lemon Lustre (m), Spectacular (ml), Sun Glow (m), Yellow Crown (e): yellow

Isle of Capri (e), Orange Chiffon (m), Orange Gleam (ml), Talisman (em), Tangerine (m): buff and orange

Big League (ml), Kathleen Alison (m), Parade (em): salmon

Firechief (m), Red Freckles (m): scarlet

Daydream (ml), Pink Prospector (em), Priscilla (e), Vicki Lin (m): light pink

Miss America (m), Powderpuff (m), True Love (m): deep pink

Cardinal (m), Commando (m), Foxy Lady (ml), Shirley Cole (em): light and mid-red

Big Time (ml), Ecstasy (ml), Mexicali Rose (ve), Royal Rose (ml): rose

Black Stallion (m), Christmas Red (m), Red Majesty (em): dark red

Anniversary (ml), Beverly Ann (em), Dawn Watch (m), Dream Time (m), Panorama (m): lavender

King David (em), Night Owl (ml), Plum Tart (em): purple

Blue Isle (m), Blue Mountain (m), Her Majesty (em), Navy Blue (e): blue and violet

Gay Parasol (m), Owl Soup (m), Shady Lady (e): smoky and multicolor

Small-flowered

Lambkin (em), Littlest Angel (m), Snow Elf (m): white

Emerald Isle (m), Natty (e), Spring Green (em): green

Dew Drop (m), Domino (em): cream

Goldette (em), Nugget (em), Sun Frolic (em): yellow

Bugs (m), Dolly (m), Tinkerbell (em): orange

Little Mo (m), Small Talk (em), Sundown (m): buff and bronze

Jackpot (em), Leslie Ann (m): salmon

Foxfire (m), Red Butterfly (ve): scarlet

Baby Doll (m), Blushing Bride (m), Love and Lace (m), Sweetie Pie (m): light pink

High Hopes (em), Miss Muffet (m), Saucy Suzy (em): dark pink

Chit Chat (ve), Red Bantam (m), Trump (m): light and mid-red

Claret (m), Gallery (e), Tattoo (m): rose

Little Sweetheart (m), Pixie Chief (e): dark red

Dandy (em), Elura (em), Hummingbird (m): lavender

Garnette (e), Grapejuice (m), Oriental Ruby (m): purple

Bluebird (e), Blue Ribbon (em): violet and blue

Genie (em), Papoose (m): multitone

OTHER BULBS GROWN IN CANADA

Many of the bulbs discussed here require particular conditions of soil, moisture, and light. That is why they are less well known than the common hardy and tender bulbs covered earlier. Some of these are hardy, others are tender; and a few species of one genus, *Allium*, are grown for their distinctive flavor as well as for their beauty.

Acidanthera bicolor This tender, flowering corm from Africa is similar in culture and foliage to the gladiolus. It has delicate, very fragrant white flowers with deep-maroon centers, borne in a loose two-ranked spike. It blooms in August or September. Height 60-90 cm.

The more recently introduced species *A. murieliae* from Ethiopia seems to be easier to grow.

Agapanthus africanus Lily-of-the-Nile. As this plant is slow growing it is usually treated as a pot plant. Tubers started in March and set out in the garden bed still in their pots will usually bloom in late summer. They can be lifted before a frost and will continue to flower indoors. The clusters of funnel-shaped blue flowers are borne above the foliage. The species grows to 90 cm but new dwarf strains reach only half this height.

Allium Onions, chives, and garlic belong to this large genus. Many of the hardy garden forms are particularly popular for rock gardens. The rough or flattened tubular foliage varies in length from a few centimetres to more than 30 cm. The round heads of small flowers are white, lavender, purple, rose, or yellow. Height from a few centimetres to 150 cm.

Propagation is from bulbs or from seed. It is better not to let the flowers go to seed. The plants grow best on well-drained, sandy or gravelly soil and may be left in the same spot for years. Plant or transplant in spring.

A. aflatunense The light purple flowers of this very hardy species appear in June. Height up to 150 cm.

A. giganteum This plant is suited to the perennial border; the spherical heads of violet flowers on 150 cm stems appear in July.

A. karataviense The prostrate foliage is attractive in early spring as it is steel blue on top and purple beneath. Dull pink flowers bloom in July. Height 15-20 cm.

A. moly The lily leek is a well-known species. It has loose clusters of yellow flowers in June or July. Height 30-45 cm.

A. oreophilum (ostrowskianum) A good rock-garden species, with small heads of pinkish red flowers in June. Height 15 cm.

A. schoenoprasum Chives. This useful salad plant is pretty in a flower border. It has neat clumps of dark green foliage and rose purple flowers that bloom in June or July. Height 30-60 cm.

Anemone The small tubers look like pieces of wrinkled leather. The St. Brigid strain has semidouble flowers, in mixed colors, which are excellent for cutting. They are not reliably hardy in the Ottawa area even with good snow cover, so treat like gladiolus and store over winter. The spring-flowering *A. blanda* is hardy and will self-seed if located in light shade. The species has pastel pink or blue flowers but named cultivars are available with stronger tones.

Arisaema triphyllum Jack-in-the-pulpit. This tuberous-rooted native plant grows in moist, partly shaded, fibrous soil. Its red berries in the fall attract more attention than the inconspicuous spring bloom. Plant in fall and leave for years.

Belamcanda chinensis The blackberry-lily has red-spotted, orange flowers, followed by a cluster of black seeds at the top of a branching stem. It grows only in very mild districts. Protect by a mulch in winter.

Bulbocodium vernum Spring saffron. This is very like crocus, except that flowers appear before leaves. Rose lavender flowers bloom in early spring, and the plants may be left in the same spot for years. Height 15 cm.

Calla elliottiana See *Zantedeschia*.

Calochortus Several species of these unusual globe-tulips, or Mariposa-lilies, are native to the western United States. Grow as tulips in very well drained, warm soil. Protect by a mulch in winter, even in mild districts.

Camassia leichtlinii This tender bulb has starry blue flowers that combine well with daffodils. Grows best in milder districts and needs a mulch in winter.

Chlidanthus fragrans Delicate-lily. Treat bulbs in the same way as gladiolus but plant only 5 cm deep in well-drained fibrous soil. This plant has broad leaves, with umbels of tubular yellow flowers. Height 40-45 cm.

Claytonia virginica The native spring-beauty naturalizes well in moist but well-drained shady spots where its rosy-veined white flowers and grassy foliage look good among ferns.

Crinum Bengal-lily. The deciduous species can be grown in districts that have a long fall season. The plants are similar to amaryllis and have long, tubular, pink or white flowers and strap-shaped foliage.

Crocosmia* × *crocosmiiflora Commonly known as montbretia. These tender bulbs produce showy spikes of orange to crimson flowers in August and September. They are similar in culture to gladiolus but more tolerant of part shade. Plant 5-8 cm deep; they will grow 75-100 cm in height.

Eranthis hyemalis Winter-aconite is one of the earliest perennials to bloom, in April or May. The yellow flowers are surrounded by a frill of finely cut foliage.

Plant tubers in early fall and leave for years. They spread by self-sown seed. Height 12-18 cm.

Eremurus Foxtail-lily is excellent for the back of the perennial border. The bare stem, rising from a strong rosette of swordlike foliage, carries a long spike of bell-like flowers. Plant fleshy roots in September and leave for years. They need some protection during winter; mulch if snow coverage is uncertain.

E. elwesii Pink flowers bloom in June. Height to 200 cm.

E. himalaicus White flowers bloom in June. Height 100-200 cm.

E. robustus Pink flowers bloom in June. Height 150-200 cm.

E. stenophyllus (bungei) Yellow flowers bloom in July. Height 60-120 cm.

Erythronium americanum The native trout-lily, usually called dog-tooth violet, provides a spring show of yellow flowers in moist but well-drained shady spots. The nodding solitary flowers, with flaring, recurved segments, rise on a bare stem from twin bright green leaves. Plant in early fall and leave for years.

Galtonia candicans Cape-hyacinth. This tender, summer-flowering bulb has long strap-shaped foliage. The long stem is crowned with a loose raceme of nodding white bells in August or September. Treat these bulbs in the same way as gladiolus but store in sand or vermiculite.

Hippeastrum Amaryllis. These tender bulbs are usually grown indoors, but they can be grown outdoors in districts with a long growing season. Treat in the same way as gladiolus but store in dampened peat moss or vermiculite.

Hymenocallis narcissiflora (calathina) Ismene- or Peruvian-lily has large, fragrant white flowers resembling daffodils. There are also hybrid forms, such as the yellow-flowered Sulphur Queen. Flowers are in umbels (flat-topped terminal clusters), on a bare stem. Do not plant bulbs until soil is warm. After digging in the fall, hang bulbs upside down until the foliage dries, then store in moist peat moss or vermiculite.

Iris Many bulbous irises are hardy only in the mildest parts of Canada. Venturesome gardeners may try them elsewhere, mulching well for winter protection. Plant in September.

I. danfordiae* and *I. histrioides These two species are closely related to *I. reticulata* but they flower earlier. Danford's iris is bright yellow and often flowers with the last of the snow. A few days later the blue *I. histrioides* comes into flower. The variety *major* which is larger flowered is the one usually offered in catalogs.

I. reticulata This iris is reliable at Ottawa. It has small blue flags (flowers) on short stems and is used chiefly in rock gardens. There are named cultivars in blue to mauve shades. Height 10-15 cm.

I. xiphioides The so-called English iris is a native of the Pyrenees. It prefers moist, cool soil. There are several cultivars in white, blue, and purple.

I. xiphium Spanish iris is a native of hot climates. Dig bulbs for summer drying, like tulips, and replant for development in the fall. (When bulbs are left in the ground they mature only in hot, dry summers.) Mulch, even in mild districts.

Dutch irises are garden hybrids. They bloom a little earlier than English or Spanish irises.

Ixia Corn-lily is another tender bulb that may be grown outdoors if treated like gladiolus. It has low, grassy foliage and bare stems supporting loose spikes of variously colored flowers.

Ixiolirion tataricum (pallasii) Siberian-bluebell is too tender for Ottawa but in milder districts can be grown under winter mulch. It has grassy foliage and starry blue flowers that bloom in May. Plant in August. Height 30–45 cm.

Lycoris squamigera Hall-amaryllis is not reliable at Ottawa, but is an old favorite in milder districts. The large straplike leaves appear in May and die in midsummer. Clusters of pale lavender, lilylike flowers on tall stems follow in August. Plant 25–30 cm deep in rich loam in either spring or fall. Height 100 cm.

Montbretia See *Crocosmia*.

Polianthes tuberosa Tuberoses are so fragrant that they should be planted at a distance from the house, where their tall spikes of white, waxy flowers make a good show. As they require a long season in warm soil, they can be grown only in limited areas. Store bulbs over winter in vermiculite at 20°C. Height 100 cm.

Polygonatum Solomon's-seal grows well in shade. Arching stems rise from a fleshy rhizome. Tubular white flowers hang down below the leaves and are followed by bright red berries.

P. biflorum This is a native form with one to four flowers in the axils of leaves. It blooms in May or June.

P. multiflorum The species came from Europe. It has two to eight flowers in the axils of leaves and blooms in May or June.

Ranunculus asiaticus Ranunculus is a tuberous-rooted species of the buttercup family. It has large flowers in several bright colors. The double peony-flowered strain is the most popular. Plant tubers in spring in rich, fibrous, sandy soil that has plenty of moisture. Store over winter in vermiculite.

Smilacina stellata False Solomon's-seal. The flowers are in terminal racemes, and not in the axils of the leaves as in true Solomon's-seal. Also the leaves are alternate rather than opposite. The bright red fruits are in terminal clusters. The plant does well in moist woods. Plant in late fall.

Sprekelia formosissima St. James's-lily. This tender bulb has fleeting, spidery, crimson flowers, one to a stem. Plant about June 1. Dig in the fall and store in vermiculite at 10–15°C. Height 45 cm.

Sternbergia lutea Sternbergia can be grown only in mild districts as it does not bloom until late fall. Dark, glossy foliage surrounds the very bright yellow, funnel-like flowers. Where hardy, the plants may be left for years.

Tigridia pavonia Mexican-tiger or shellflower. This tender bulb should be grown by more people. The varicolored triangular flowers last only a day but there are several to a stem. They bloom in July or August. Plant bulbs 5-8 cm deep and treat like gladiolus. They grow best in warm sandy soil with full sunlight, but they tolerate shade.

Zantedeschia elliottiana Yellow calla. This tender bulb grows more successfully in the garden than do other greenhouse species of calla-lilies. The spotted foliage and yellow cornucopia flowers are attractive. Treat like tuberous begonias.

Zephyranthes candida The white fairy-lily is most satisfactory to grow as a novelty. Its white, funnel-like, solitary flowers bloom above grassy foliage in August or September. Treat like gladiolus.

ADDRESSES OF SOME FLOWER SOCIETIES

Persons wanting more information about certain plants may wish to contact the following societies:

Canadian Chrysanthemum and Dahlia Society

Mr. L. Dickson, 24 Eden Mills Drive, West Hill, Ontario M1E 4L2

Canadian Gladiolus Society

Mr. R. Powys-Lybbe, Box 845, High River, Alberta T0L 1B0

Canadian Iris Society

Miss V. Laurin, 199 Florence Ave., Willowdale, Ontario M2N 1G5

Ontario Regional Lily Society

Mrs. G. Brown, R.R. 1, Harley, Ontario N0E 1E0

Canadian Prairie Lily Society

Dr. A. E. Maginnes, 614 Acadia Drive, Saskatoon, Saskatchewan S7H 3U9

LIST OF COMMON AND GENERIC NAMES OF BULBS

Common name	Generic name
acidanthera	*Acidanthera*
aconite, winter-	*Eranthis*
allium	*Allium*
amaryllis	*Hippeastrum*
amaryllis, Hall-	*Lycoris*
anemone	*Anemone*
begonia	*Begonia*
Bengal-lily	*Crinum*
blackberry-lily	*Belamcanda*
bluebell, English	*Endymion*
bluebell, Siberian-	*Ixiolirion*
bluebell, Spanish	*Endymion*
calla, yellow	*Zantedeschia*
camassia	*Camassia*
candlestick lily	*Lilium*
canna	*Canna*
cape-hyacinth	*Galtonia*
checkered-lily	*Fritillaria*
chives	*Allium*
corn-lily	*Ixia*
crocus	*Crocus*
crocus, fall-	*Colchicum*
crocus, Scotch	*Crocus*
crown-imperial	*Fritillaria*
daffodil	*Narcissus*
dahlia	*Dahlia*
Danford's iris	*Iris*
delicate-lily	*Chlidanthus*
dog-tooth violet	*Erythronium*
Dutch iris	*Iris*
English bluebell	*Endymion*
English iris	*Iris*
fairy-lily, white	*Zephyranthes*
fall-crocus	*Colchicum*
false Solomon's-seal	*Smilacina*
foxtail-lily	*Eremurus*
flag iris	*Iris*
fritillary, yellow	*Fritillaria*
garden iris	*Iris*
gladiolus	*Gladiolus*
globe-tulip	*Calochortus*
glory-of-the-snow	*Chionodoxa*
grape-hyacinth	*Muscari*

Common name	Generic name
Hall-amaryllis	*Lycoris*
Hanson's lily	*Lilium*
hyacinth	*Hyacinthus*
hyacinth, cape-	*Galtonia*
hyacinth, grape-	*Muscari*
iris	*Iris*
iris, Danford's	*Iris*
iris, Dutch	*Iris*
iris, English	*Iris*
iris, flag	*Iris*
iris, garden	*Iris*
iris, Spanish	*Iris*
Ismene-lily	*Hymenocallis*
Jack-in-the-pulpit	*Arisaema*
lady tulip	*Tulipa*
leek, lily	*Allium*
lily	*Lilium*
lily, Bengal-	*Crinum*
lily, blackberry-	*Belamcanda*
lily, candlestick	*Lilium*
lily, checkered-	*Fritillaria*
lily, corn-	*Ixia*
lily, delicate-	*Chlidanthus*
lily, foxtail-	*Eremurus*
lily, Hanson's	*Lilium*
lily, Ismene-	*Hymenocallis*
lily leek	*Allium*
lily, madonna	*Lilium*
lily, Mariposa-	*Calochortus*
lily-of-the-Nile	*Agapanthus*
lily-of-the-valley	*Convallaria*
lily, Peruvian-	*Hymenocallis*
lily, regal	*Lilium*
lily, St. James's-	*Sprekelia*
lily, snake's-head	*Fritillaria*
lily, trout-	*Erythronium*
lily, white fairy-	*Zephyranthes*
madonna lily	*Lilium*
Mariposa-lily	*Calochortus*
Mexican-tiger	*Tigridia*
montbretia	*Crocosmia*
narcissus	*Narcissus*
onion	*Allium*
painted trillium	*Trillium*
paperwhite	*Narcissus*

Common name	Generic name
Peruvian-lily	*Hymenocallis*
purple trillium	*Trillium*
ranunculus	*Ranunculus*
regal lily	*Lilium*
saffron, spring	*Bulbocodium*
St. James's-lily	*Sprekelia*
Scotch crocus	*Crocus*
shellflower	*Tigridia*
Siberian-bluebell	*Ixiolirion*
Siberian squill	*Scilla*
snake's-head lily	*Fritillaria*
snowdrop	*Galanthus*
snowflake	*Leucojum*
snowflake, summer	*Leucojum*
Solomon's-seal	*Polygonatum*
Solomon's-seal, false	*Smilacina*
Spanish bluebell	*Endymion*
Spanish iris	*Iris*
spring-beauty	*Claytonia*
spring saffron	*Bulbocodium*
squill	*Scilla*
squill, Siberian	*Scilla*
squill, striped-	*Puschkinia*
squill, Tubergen's	*Scilla*
star-of-Bethlehem	*Ornithogalum*
sternbergia	*Sternbergia*
striped-squill	*Puschkinia*
summer snowflake	*Leucojum*
tiger, Mexican-	*Tigridia*
trillium	*Trillium*
trillium, painted	*Trillium*
trillium, purple	*Trillium*
trillium, white	*Trillium*
trout-lily	*Erythronium*
Tubergen's squill	*Scilla*
tuberose	*Polianthes*
tulip	*Tulipa*
tulip, globe-	*Calochortus*
tulip, lady	*Tulipa*
tulip, water-lily	*Tulipa*
violet, dog-tooth	*Erythronium*
water-lily tulip	*Tulipa*
white fairy-lily	*Zephyranthes*
white trillium	*Trillium*
winter-aconite	*Eranthis*

Common name	Generic name
yellow calla	*Zantedeschia*
yellow fritillary	*Fritillaria*

CONVERSION FACTORS

Metric units	Approximate conversion factors	Results in:
LINEAR		
millimetre (mm)	x 0.04	inch
centimetre (cm)	x 0.39	inch
metre (m)	x 3.28	feet
kilometre (km)	x 0.62	mile
AREA		
square centimetre (cm^2)	x 0.15	square inch
square metre (m^2)	x 1.2	square yard
square kilometre (km^2)	x 0.39	square mile
hectare (ha)	x 2.5	acres
VOLUME		
cubic centimetre (cm^3)	x 0.06	cubic inch
cubic metre (m^3)	x 35.31	cubic feet
	x 1.31	cubic yard
CAPACITY		
litre (L)	x 0.035	cubic feet
hectolitre (hL)	x 22	gallons
	x 2,5	bushels
WEIGHT		
gram (g)	x 0.04	oz avdp
kilogram (kg)	x 2.2	lb avdp
tonne (t)	x 1.1	short ton
AGRICULTURAL		
litres per hectare (L/ha)	x 0.089	gallons per acre
	x 0.357	quarts per acre
	x 0.71	pints per acre
millilitres per hectare (mL/ha)	x 0.014	fl. oz per acre
tonnes per hectare (t/ha)	x 0.45	tons per acre
kilograms per hectare (kg/ha)	x 0.89	lb per acre
grams per hectare (g/ha)	x 0.014	oz avdp per acre
plants per hectare (plants/ha)	x 0.405	plants per acre